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EXAMINER	
MEW, KEVIN D	

ART UNIT	PAPER NUMBER
2616	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/837,329	TOSHIMITSU ET AL.	
	Examiner	Art Unit	
	Kevin Mew	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 January 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *12-15,18 and 23-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *23-40* is/are rejected.

7)☒ Claim(s) *12-15 and 18* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Final Action

Response to Amendment

1. Applicant's Remarks/Arguments filed on 3/16/2005 regarding claims 12-15, 18, 23-40 have been considered. Claims 1-11, 16-17, 19-22 have been canceled, and claims 23-40 have been newly added by applicant. Claims 12-15, 18, 23-40 are currently pending.

2. Acknowledgement is made of the amended claims 12, 15 with respect to the 35 U.S.C. 112, second paragraph rejections of claims 12, 15. The amended claims are acceptable and the 35 U.S.C. 112, second paragraph rejections have been withdrawn.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 31-32, 34 are rejected under 35 U.S.C. 102(e) as being anticipated by Spinar et al. (US Publication 2002/0080816).

Regarding claim 31, Spinar discloses a frame configuration method for time division multiplexed frames to transfer signals between a radio base station and a plurality of radio terminals, the frame configuration method comprising:

(a) allocating communication bandwidths of an identical time in different frames to different radio terminals (**allocating bandwidths to the uplink and downlink sub-frames of different physical channels**) such that there is substantially no mutual interference among those signals to be transferred at the identical time with respect to the different radio terminals (**such that each of the uplink and downlink sub-frame maps may have their own distanct frequency**, paragraph 0117); and

(b) allocating entire frame configuration information (**allocating bandwidth to a particular physical channel on the uplink and downlink**) indicating frame configurations of all the time division multiplexed frames to one of the time division multiplexed frames (**indicating the bandwidth allocations of all the multiplexed uplink and downlink sub-frames**, paragraphs 0117).

Regarding claim 32, Spinar discloses the frame configuration method of claim 31, wherein the step (b) allocates the entire frame configuration information to a frame to which a control information (**control information of a downlink frame**) to be transmitted to all the radio terminals simultaneously is allocated (**downlink frame is broadcast to all CPE stations**, paragraph 0123).

Regarding claim 34, Spinar discloses a frame configuration method for time division multiplexed frames to transfer signals between a radio base station and a plurality of radio terminals, the frame configuration method comprising:

(a) allocating communication bandwidths in different frames to different radio terminals (**allocating bandwidths to the uplink and downlink sub-frames of different physical channels**) such that there is substantially no mutual interference among those signals to be transferred at the identical time with respect to the different radio terminals (**such that each of the uplink and downlink sub-frame maps may have their own distanct frequency**, paragraph 0117); and

(b) allocating a plurality of frame configuration information (**allocating bandwidth to a particular physical channel on the uplink and downlink;** a physical channel comprises uplink and downlink subframes) each indicating frame configuration of a respective time division multiplexed frame, to corresponding ones of the time division multiplexed frames respectively (**indicating the bandwidth allocations of all the multiplexed uplink and downlink sub-frames**, paragraphs 0117).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 23-30, 37-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Molnar et al. (USP 6,694,154) in view of Spinar et al. (US Publication 2002/0080816).

Regarding claim 23, Molnar discloses a radio base station for transferring signals (**base station uses a directional beam antenna to generate a plurality of narrow beams for**

processing calls a call from one or more mobile stations, see col. 5, lines 59-67 and col. 6, lines 1-11) of time division multiplexed frames (**using TDMA protocol**, see col. 5, lines 46-50) with respect to a plurality of radio terminals (**mobile stations**, see col. 6, lines 8-11), the radio base station comprising:

a beam formation unit configured to form a plurality of space dividing beams simultaneously (**a beamforming processor is used in the base station to selectively direct the required number of beams toward the target mobile terminal**, see col. 11, lines 40-50);

a plurality of antenna elements (**antenna elements 505, 510, 515**, see Fig. 5) configured to transfer the signals with respect to the radio terminals by transmitting the plurality of space dividing beams toward the radio terminals (**antenna elements are connected to the beamformer circuit 520 which shapes and steers the plurality of beams which are tailored to maximize the signal-to-interference ratio of the signals received from the mobile terminal**, see col. 9, lines 19-29, col. 11, lines 44-50 and Fig. 5); and

a scheduling processing unit (**interference-rejection-combining receiver for use in the base station**, see col. 5, lines 15-17) configured to allocate communication bandwidths to the radio terminals (**the channel tap estimators of the interference-rejection-combining receiver produce channel tap estimates which are used to model the radio transmission channel associated with each antenna element**, see col. 10, lines 51-67) such that there is substantially no mutual interference among those signals to be transferred by different frames (**to separate the wanted signals from the unwanted signals**, see col. 3, lines 57-64), with respect to a plurality of frames (**TDMA**, see col. 5, lines 46-50) that are corresponding to at least one of the plurality

of space dividing beams (**each beam is transmitting signals which are in the form of TDMA frames**, see col. 6, lines 19-24 and Fig, 4),

wherein there is substantially no mutual interference among those signals to be transferred as the identical time with respect to the different radio terminals (**interference-rejection-combining receiver for use with phase-array antenna in the base station**, see col. 5, lines 15-17 and Fig. 5), and

Molnar does not explicitly show a scheduling processing unit allocates communication bandwidths of an identical time in different frames to different radio terminals and allocates entire frame configuration information indicating frame configurations of all the time division multiplexed frames to corresponding ones of the time division multiplexed frames respectively.

However, Spinar discloses a base station MAC scheduler that allocates bandwidths for the uplink and downlink communications within a particular physical channel (**allocating entire frame configuration information**, paragraphs 0043, 0117 and Fig. 2; bandwidth is interpreted as frame configuration) according to the bandwidth requirements specified in the uplink and downlink sub-frame maps (**indicating frame configurations of all the time division multiplexed frames to corresponding ones of the time division multiplexed frames respectively**, paragraphs 0043, 0117 and Fig. 2; uplink and downlink sub-frames are time division multiplexed frames).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the bandwidth allocation method and system of Molnar with the teaching of Spinar such that multi-antenna radio base station of Molnar will allocate bandwidths within a physical channel according to the uplink and downlink sub-frame maps. The motivation

to do so is to allocate different bandwidths to different physical channels comprising uplink and downlink subframes in accordance with the user traffic needs.

Regarding claim 24, Molnar discloses the radio base station of claim 23, wherein the scheduling processing unit schedules such that the entire frame configuration information is notified to all the radio terminals simultaneously (**broadcast bandwidth allocation to users**, paragraph 0091).

Regarding claim 25, Molnar discloses a radio base station for transferring signals of time division multiplexed frames with respect to a plurality of radio terminals, the radio base station comprising:

a beam formation unit configured to form a plurality of space dividing beams simultaneously (**a beamforming processor is used in the base station to selectively direct the required number of beams toward the target mobile terminal**, see col. 11, lines 40-50);

a plurality of antenna elements (**antenna elements 505, 510, 515**, see Fig. 5) configured to transfer the signals with respect to the radio terminals by transmitting the plurality of space dividing beams toward the radio terminals (**antenna elements are connected to the beamformer circuit 520 which shapes and steers the plurality of beams which are tailored to maximize the signal-to-interference ratio of the signals received from the mobile terminal**, see col. 9, lines 19-29, col. 11, lines 44-50 and Fig. 5); and

there is substantially no mutual interference among those signals to be transferred by different frames (**to separate the wanted signals from the unwanted signals**, see col. 3, lines

57-64), with respect to a plurality of frames (**TDMA**, see col. 5, lines 46-50) that are corresponding to at least one of the plurality of space dividing beams (**each beam is transmitting signals which are in the form of TDMA frames**, see col. 6, lines 19-24 and Fig, 4),

wherein there is substantially no mutual interference among those signals to be transferred as the identical time with respect to the different radio terminals (**interference-rejection-combining receiver for use with phase-array antenna in the base station**, see col. 5, lines 15-17 and Fig. 5), and

Molnar does not explicitly show a scheduling processing unit that allocates communication bandwidths of an identical time in different frames to different radio terminals and allocating a plurality of frame configuration information each indicating frame configurations of all the time division multiplexed frames to corresponding ones of the time division multiplexed frames respectively.

However, Spinar discloses a base station MAC scheduler that allocates bandwidths for the uplink and downlink communications within a particular physical channel (**allocating a plurality of frame configuration information**, paragraphs 0043, 0117 and Fig. 2; bandwidth is interpreted as frame configuration) according to the bandwidth requirements specified in the uplink and downlink sub-frame maps (**each indicating a frame configuration of a respective time division multiplexed frame, to corresponding ones of the time division multiplexed frames respectively**, paragraphs 0043, 0117 and Fig. 2; uplink and downlink sub-frames are time division multiplexed frames).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the bandwidth allocation method and system of Molnar with the teaching of Spinar such that multi-antenna radio base station of Molnar will allocate bandwidth to each of the plurality of uplink and downlink subframes within a physical channel according to the uplink and downlink sub-frame maps. The motivation to do so is to allocate different bandwidths to different physical channels comprising uplink and downlink subframes in accordance with the user traffic needs.

Regarding claim 26, Molnar discloses the radio base station of claim 25, wherein the scheduling processing unit schedules such that the plurality of frame configuration information are notified to all the radio terminals simultaneously (**broadcast bandwidth allocation to users**, paragraph 0091).

Regarding claim 27, Molnar discloses the radio base station of claim 23, further comprising:

a memory unit configured to store weights respectively corresponding to the radio terminals, that are to be used in forming the plurality of space dividing beams (**weighting module which applies weight to individual RF link**, col. 12, lines 23-38); and

a weight control unit configured to set the weights to the beam formation unit (**the weighting of adaptive beamforming processor is adjusted by a controller to direct a beam in a desired direction**, col. 11, lines 59-65, col. 12, lines 23-38 and Fig. 8).

Regarding claim 28, Molnar further discloses the radio base station of claim 27, wherein there is substantially no mutual interference among those signals to be transferred at the identical time with respect to the different radio terminals (**minimize the interference of signals received from mobile terminal**, page 11, lines 39-65), according to weights respectively corresponding to the different radio terminals (**by adjusting the weighting during beamforming for each RF link**, col. 12, lines 22-38) as stored in the memory unit (**weighting module**, col. 12, lines 23-38).

Regarding claim 29, Molnar discloses the radio base station of claim 27, wherein the scheduling processing unit handles a group of radio terminals with similar weights as an identical radio terminal (see col. 2, lines 44-67 and col. 3, line 1).

Regarding claim 30, Molnar discloses the radio base station of claim 27, wherein the beam formation unit (**beamforming processor**, element 800, Fig. 8) has a multi-beam formation circuit (**has a controller**, element 810, Fig. 8) configured to form the plurality of space dividing beams simultaneously (**select a number of beams toward the target terminals**, col. 11, lines 40-50) by weighting the signals to be transmitted or received by the antenna elements (**weighting the RF links to be transmitted by the antenna elements**, col. 12, lines 12-38 and elements 505, 510, 515, Fig. 8) using the weights set by the weight control unit(**the weighting of adaptive beamforming processor is adjusted by a controller to direct a beam in a desired direction**, col. 11, lines 59-65, col. 12, lines 23-38 and Fig. 8).

Regarding claim 37, Molnar discloses the radio base station of Claim 25, further comprising:

a memory unit configured to store weights respectively corresponding to the radio terminals, that are to be used in forming the plurality of space dividing beams (**weighting module which applies weight to individual RF link**, col. 12, lines 23-38); and

a weight control unit configured to set the weights to the beam formation unit (**the weighting of adaptive beamforming processor is adjusted by a controller to direct a beam in a desired direction**, col. 11, lines 59-65, col. 12, lines 23-38 and Fig. 8).

Regarding claim 38, Molnar discloses the radio base station of Claim 37, wherein the there is substantially no mutual interference among those signals to be transferred at the identical time with respect to the different radio terminals (**minimize the interference of signals received from mobile terminal**, page 11, lines 39-65), according to weights respectively corresponding to the different radio terminals (**by adjusting the weighting during beamforming for each RF link**, col. 12, lines 22-38) as stored in the memory unit (**weighting module**, col. 12, lines 23-38).

Regarding claim 39, Molnar discloses the radio base station of claim 37, wherein the scheduling processing unit handles a group of radio terminals with similar weights as an identical radio terminal (see col. 2, lines 44-67 and col. 3, line 1).

Regarding claim 40, Molnar discloses the radio base station of Claim 37, wherein the beam formation unit has a multi-beam formation circuit (**adaptive beamforming unit**, element

800, Fig. 8) configured to form the plurality of space dividing beams simultaneously by weighting the signals to be transmitted or received by the antenna elements using the weights set by the weight control unit (**applying and adjusting weights stored in the weighting module when forming a plurality of beams**, col. 11, lines 40-65, col. 12m lines 1-38).

5. Claims 33, 35-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Spinar et al. (US Publication 2002/0080816) in view of Molnar et al. (USP 6,694,154).

Regarding claim 33, Spinar discloses the frame configuration method of claim 31, wherein the step (a) allocates the communication bandwidths of the identical time in the different frames to the different radio terminals, except fails to disclose there is substantially no mutual interference among those signals to be transferred at the identical time with respect to the different radio terminals, according to weights respectively corresponding to the radio terminals, that are to be used in forming a plurality of space dividing beams for transferring the signals between the radio base station and the radio terminals.

However, Molnar discloses there is substantially no mutual interference among those signals to be transferred with respect to the different radio terminals (**minimize the interference of signals received from mobile terminal**, page 11, lines 39-65), according to weights respectively corresponding to the radio terminals (**by adjusting the weighting during beamforming for each RF link**, col. 12, lines 22-38), that are to be used in forming a plurality of space dividing beams for transferring the signals between the radio base station and the radio terminals (**to be used in forming a plurality of beams**, col. 11, lines 40-65, col. 12, lines 22-38, and Figs. 7 and 8).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the bandwidth allocation method and system of Spinar with the teaching of Molnar in employing adaptive beamforming by applying weighting when forming a plurality of beams such that mutual interference between signals transferred the base station and mobile stations will be minimized. The motivation to do so is to maintain a good quality of communications between the base station and mobile terminals so that loss of information in the uplink and downlink would be reduced.

Regarding claim 35, Spinar discloses the frame configuration method of claim 34, wherein the step (a) allocates the communication bandwidths in the different frames to the different radio terminals (**allocates bandwidths to the uplink and downlink subframes of physical channels between base station and mobile stations**, paragraph 0117).

Spinar does not explicitly show there is substantially no mutual interference among those signals to be transferred with respect to the different radio terminals, according to weights respectively corresponding to the radio terminals, that are to be used in forming a plurality of space dividing beams for transferring the signals between the radio base station and the radio terminals.

However, Molnar discloses there is substantially no mutual interference among those signals to be transferred with respect to the different radio terminals (**minimize the interference of signals received from mobile terminal**, page 11, lines 39-65), according to weights respectively corresponding to the radio terminals (**by adjusting the weighting during beamforming for each RF link**, col. 12, lines 22-38), that are to be used in forming a plurality

of space dividing beams for transferring the signals between the radio base station and the radio terminals (**to be used in forming a plurality of beams**, col. 11, lines 40-65, col. 12, lines 22-38, and Figs. 7 and 8).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the bandwidth allocation method and system of Spinar with the teaching of Molnar in employing adaptive beamforming by applying weighting when forming a plurality of beams such that mutual interference between signals transferred the base station and mobile stations will be minimized. The motivation to do so is to maintain a good quality of communications between the base station and mobile terminals so that loss of information in the uplink and downlink would be reduced.

Regarding claim 36, Spinar discloses a computer usable medium having computer readable program codes embodied therein for causing a computer to function as a scheduling processing unit in a radio base station for transferring signals of time division multiplexed frames with respect to a plurality of radio terminals, the computer readable program codes include:

a first computer readable program code for causing said computer to allocate entire frame configuration information indicating frame configurations of all the time division multiplexed frames to one of the time division multiplexed frames, or allocate a plurality of frame configuration information (**allocating bandwidth to a particular physical channel on the uplink and downlink;** a physical channel comprises uplink and downlink subframes) each indicating frame configuration of a respective time division multiplexed frame, to corresponding

ones of the time division multiplexed frames respectively (**indicating the bandwidth allocations of all the multiplexed uplink and downlink sub-frames**, paragraphs 0117); and

Spinar does not explicitly show a second computer readable program code for causing said computer to allocate bandwidths to frames such that there is substantially no mutual interference among those signals to be transferred with respect to the different radio terminals.

However, Molnar discloses a programmed microprocessor is used to perform interference cancellation function (col. 10, lines 25-35) that there is substantially no mutual interference among those signals to be transferred with respect to the different radio terminals (**minimize the interference of signals received from mobile terminal**, page 11, lines 39-65).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the bandwidth allocation method and system of Spinar with the teaching of Molnar in employing adaptive beamforming circuit such that mutual interference between signals transferred the base station and mobile stations will be minimized. The motivation to do so is to maintain a good quality of communications between the base station and mobile terminals so that loss of information in the uplink and downlink would be reduced.

Response to Arguments

6. Applicant's arguments with respect to claims 23-40 have been considered but are moot in view of the new ground(s) of rejection.

Allowable Subject Matter

7. Claims 12-15, 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

In claim 12, the frame configuration method of claim 11, wherein when there is a difference between total sums of the communication bandwidths allocated to the time division multiplexed frames, the step (b) allocates a next communication bandwidth to a frame for which a total sum of allocated communication bandwidths is the smallest among the time division multiplexed frames.

In claim 18, the frame configuration method of claim 17, wherein the step (b) allocates a next communication bandwidth to a frame for which a total sum of allocated communication bandwidths is smallest among the time division multiplexed frames.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Mew whose telephone number is 571-272-3141. The examiner can normally be reached on 9:00 am - 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Seema Rao can be reached on 571-272-3174. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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